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“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 14480 (2006): Side discharge Loaders for underground coal mines - Safety requirements, Operation and maintenance - Code of practice [MED 8: Mining Techniques and Equipment]

“ज्ञान से एक नये भारत का निर्माण”
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“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

भूमिगत कोयला खानों के लिए साइड-डिस्चार्ज लोडर — सुरक्षा अपेक्षाएं, प्रचालन और रख-रखाव — रीति संहिता

(पहला पुनरीक्षण)

Indian Standard

SIDE-DISCHARGE LOADERS FOR UNDERGROUND COAL MINES — SAFETY REQUIREMENTS, OPERATION AND MAINTENANCE — CODE OF PRACTICE

(First Revision)

ICS 53.100

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 2006 **Price Group 4**

Mining Techniques and Equipment Sectional Committee, ME 08

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Mining Techniques and Equipment Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1998. The experience gained in implementation of the standard has necessitated this revision.

Loaders are extensively used at mine faces in underground mining operations. These machines can be categorized in various ways on the basis of motive power (diesel operated, electrically operated or compressed air operated), mounting (wheeled loader, crawler mounted or track mounted) loading and unloading [front end loader, side-discharge loaders (SDL) or load-haul-dump (LHD) loader], etc. Basically, all these equipment can also be termed as 'Earth-moving machinery'. A number of standards have already been formulated at national level, which affects the design, manufacture, selection, operation and maintenance of this equipment. Some of these standards are:

IS No.	*Title*
10280 : 1993	Earth-moving machinery — Operation and maintenance — Format and content of manuals (*first revision*)
10303 : 1993	Earth-moving machinery — Preservation and storage (*first revision*)
10689 : 1993	Earth-moving machinery — Minimum access dimensions (*first revision*)
10704 : 1999	Earth-moving machinery — Access systems (*second revision*)
11113 : 1999	Earth-moving machinery and tractors and machinery for agriculture and forestry — Seat index point (*second revision*)
11114	Earth-moving machinery — Definitions of dimensions and symbols:
(Part 2) : 1993	Base machines (*first revision*)
(Part 3) : 1993	Equipment (*first revision*)
(Part 4) : 1993	Loaders — Terminology and commercial specifications (*first revision*)
11115 : 1999	Earth-moving machinery — Human physical dimensions of operators and minimum operator space envelope (*second revision*)
11249 : 1985	Data sheet for selection of front end loaders
11252 : 1993	Earth-moving machinery — Zones of comfort and reach for controls (*first revision*)
11738	Bulk handling equipment — Crawler tractor — Data sheet:
(Part 1) : 1993	Information to be supplied by purchaser (*first revision*)
(Part 2) : 1993	Information to be supplied by manufacturers/suppliers (*first revision*)
12138 : 1993	Earth-moving machinery — Basic types — Vocabulary (*first revision*)
12206 : 1993	Earth-moving machinery — Loader and front loading excavator buckets — Volumetric ratings (*first revision*)
12209 : 1993	Earth-moving machinery — Guide to procedure for operator training (*first revision*)
13081 : 1991	Earth-moving machinery — Symbols — Guidelines for development and evaluation
13116 : 1999	Earth-moving machinery — Engine test code — Net power (*first revision*)
13253 : 1992	Earth-moving machinery — Diagnostic ports
13768 : 1999	Earth-moving machinery — Laboratory evaluation of protective structures — Specification for deflection limiting volume (*first revision*)

(*Continued on third cover*)

Indian Standard

SIDE-DISCHARGE LOADERS FOR UNDERGROUND COAL MINES — SAFETY REQUIREMENTS, OPERATION AND MAINTENANCE — CODE OF PRACTICE

(First Revision)

1 SCOPE

This standard lays down general guidelines for safety, operation and maintenance of side-discharge loaders (SDL) used in underground mines.

2 REFERENCES

The following standards contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
10280 : 1983	Earth-moving machinery — Operation and maintenance — Format and content of manuals (*first revision*)
11114 (Part 4) : 1993	Earth-moving machinery — Definitions of dimensions and symbols: Part 4 Loaders — Terminology and commercial specifications (*first revision*)
11249 : 1985	Data sheet for selection of front end loaders
12138 : 1993	Earth-moving machinery — Basic types — Vocabulary (*first revision*)

3 APPLICATION

Use of side-discharge loaders in underground mines require compliance with specific provisions of *Mine Act* 1952 and Rules and Regulations made thereunder.

a) No SDL shall be used unless it is of a type approved by the Competent Authority and is maintained in its designed condition; and

b) The gate end box controlling power supply to the SDL machine shall be suitably interlocked with the auxiliary fan(s) ventilating the blind headings so as to ensure that unless the auxiliary fan(s) is working the SDL machine should not receive power. This requirement may be relaxed for mines having first degree gassy seams.

4 TERMINOLOGY

For the purpose of this standard, following definitions shall apply.

4.1 Loader — A self propelled crawler machine with an integral front mounted bucket supporting structure and linkage which loads or excavates through forward motion of the machine, and lifts, transports and discharges material (*see also* **2.2** of IS 12138).

4.2 Side-Discharge Loader — A loader as described by the manufacturer specification and provided with necessary mounting and attachments to secure a side-discharge bucket [*see also* **4.2**, **4.3** and **4.4** of IS 11114 (Part 4)].

4.3 Side-Discharge Bucket — A bucket which loads through forward motion of the machine and can discharge to the side from an end of the bucket [*see also* **6.1.3** and **6.3.1** of IS 11114 (Part 4)].

5 GENERAL INFORMATION AND GENERAL REQUIREMENTS OF SDL

5.1 No SDL shall be worked with hydraulic fluid which is not fire resistant and not specially approved by the Competent Authority for the purpose.

5.2 No SDL shall be constructed with materials, namely, aluminium, magnesium, etc, incentive to sparking.

5.3 The manufacturer/supplier of side-discharge loader shall provide the necessary information to the user in accordance with IS 11114 (Part 4) and IS 11249. The manuals as specified in IS 10280 shall also be supplied along with the equipment.

5.3.1 The manuals specified in **5.3** shall also include the information specified in **6** to **10**.

6 FITTINGS OF SDL

a) All rubber-tyred loaders and those crawler loaders travelling at speed exceeding 4 km/h shall be fitted with adequate service brakes and suitable parking brake. The crawler loaders travelling at speed lower than 4 km/h not equipped with brake must be provided with grade retarder/brake valve on traction motor which acts as instantaneous brake as soon as power is cut off to driving mechanism. However a suitable parking brake in addition shall be preferred;

b) A suitable warning device located conveniently near the operator such as long bell or horn shall be provided on each machine. Red light reflecting material such as fluorescent paint, etc, should be provided on each end of all mobile machines. Each machine shall be provided with at least one headlight fitting on the front and rear of the machine;

c) Each machine shall be provided with a audio-visual alarm to be appeared preferably automatically during movement in reverse direction;

d) An efficient portable fire extinguisher suitable for fire due to electricity of minimum 1 kg capacity of appropriate type so placed as to be within reach of operator shall be provided on each machine;

e) A seat for SDL driver and each arrangement of the controls that the driver can see ahead without leaning out of the SDL when running it shall be provided;

f) A protective canopy or structure to protect the driver from falling objects shall be provided;

g) Temperature gauge, temperature switch to cut-off the power in the event of temperature of hydraulic oil exceeds safe limit and a pressure gauge in hydraulic system shall be provided;

h) All electrically driven rubber tyred loaders shall be provided with a cable reeling drum for efficient and safe handling of electric cable. The crawler mounted SDL should preferably be provided with cable reel for coiling the trailing cable;

j) A foot operated dead man type switch shall be provided;

k) All high pressure hydraulic hoses fitted in the SDL's must be approved by DGMS;

m) Separate pressure gauge shall be provided for each section of the pump;

n) Filter condition indicator shall be provided; and

p) Tank mounted hydraulic return filter assembly of 25 micron (replaceable filter) along with filter condition monitoring system be preferably provided.

7 SPECIFIC REQUIREMENT FOR OPERATION

7.1 Checks at the Beginning of Shifts

The following checks shall always be carried out at the beginning of each shift:

a) Check oil and fluid levels in hydraulic tank, transfer gear boxes, crawler drive units;

b) Check filters condition;

c) Refill the grease nipples;

d) Check that all power sources are locked off;

e) Check to ensure that machine working area is clear of all obstructions;

f) Check proper tension of the crawler chain;

g) Check the oil cooler radiator and clean the fins; and

h) Check the physical condition of trailing cables in each shift.

7.2 Functional Tests

Following functional checks shall be carried out for proper operation of the machine:

a) Check all the control levers for their neutral position;

b) Check the operation of pre-start working device;

c) Check all the electrical controls for operation;

d) Check all the hydraulic circuits for travelling and loading operations;

e) Switch on the power for drive motor after the above checks; and

f) Run the machine idle for at least 5 min before it is put into operation.

7.3 Operation Mode

Following operational checks shall be carried out with empty bucket before the machine is put to actual use:

a) Push the bucket with high thrusting force of the telescopic boom into the material to be loaded;

b) Retract the boom support at the discharge point, lift the loaded bucket during travel from loading to dumping point to obtain optimum centre of gravity; and

c) Swivel the boom support at the discharge point, lift the loaded bucket to required height and finally dump the material on the available conveyance.

7.4 Precaution

Precautions necessary for extending the service life of crawler components shall also be included in the manuals. Examples of such precautions are:

a) Avoid turning the machine on crawler chains; and

b) Keep minimum lead at the face to reduce the fleeting distance.

8 SPECIFIC REQUIREMENTS FOR MAINTENANCE

8.1 Maintenance schedule daily, weekly, monthly, annually at 5 000 h and at 10 000 h as given in Annexes A to E shall be strictly followed and proper records maintained. Specific attention shall be paid to hydraulic systems. Assembling and dismantling of the machine shall be carried out in accordance with manufacturer's instructions.

8.2 Hydraulic System

Following checks shall be carried out for hydraulic systems:

a) Bring the hydraulic fluid up to operating temperature, 40 to 50°C prior to hydraulic system checking;

b) Check the flow and pressure using flow meter and pressure gauge respectively;

c) Wherever applicable, adjust, if required, flowrate at zero pressure within the hydraulic circuit;

d) Adjust, if required, the operating pressure by adjusting the pressure regulating valve. Operating pressure should not be set higher than the minimum required;

e) Check the complete hydraulic system after necessary adjustments;

f) Repeat the same till desired flowrate is obtained at the specified pressure;

g) Change fire resistant hydraulic fluid (FRHF) at every 1 500 h;

h) The operating temperature of the hydraulic fluid shall not exceed 65°C in any case. To ensure low operating temperatures, check cooling system is properly in operation. Clean and set all relief valves properly and working areas adequately ventilated;

j) Check the filter conditions. Clean or replace filter element if necessary. Filter element should be in green mode. Life of filter shall not exceed 500 h;

k) FRHF of different makes shall not be mixed;

m) On line filtration arrangement shall be provided for periodic filtration of fire resistant hydraulic fluid; and

n) Contamination of FRHF to be avoided.

8.3 Mechanical System

Following checks shall be carried out:

a) Check all fasteners of crawlers, gear boxes, motor base and pump flange. Tighten them with torque wrenches as per recommendations of the manufacturer;

b) Check the tightness of crawler chain. Adjust the tensioning force of the chain strictly according to the manufacturer's recommendations. Low tensioned chains result in slipping the sprocket and excessively tensioned chains results in high wear and load on crawler parts and drives; and

c) Ensure effectiveness of brake/grade retarders/brake valve.

8.4 Electrical System

a) Flame proof features of all the electrical equipment shall be maintained;

b) Remote control/earth leakage protections/all electrical controls of the machine shall be kept in working order; and

c) Insulation resistance of the trailing cable should be above 1 MΩ, when tested by 500 V megger.

9 OTHER SPECIFIC REQUIREMENTS

9.1 Electrical

a) No part of the structure or frame of the metallic body shall form a part or be connected to the electrical circuit except earthing;

b) All electrical equipments associated with SDL shall be of adequate rating;

c) All conductors shall be properly insulated, installed and maintained in such a manner to prevent leakage or sparking;

d) All conductors, contacts, links and fuses shall be properly enclosed to prevent accidental contact;

e) The terminals, contacts, links and fuses shall be maintained in such a way that there is no possibility of any part becoming loose and locking metallic structures on frame of the SDL;

f) Plug and socket assembly affixed to the motor and gate and box shall be so inter-locked so as to prevent withdrawal of plug from socket when live;

g) The trailing cable shall be inspected by competent person before the start of the shift to maintain that it is in proper order and any damage noticed in the cable shall immediately be reported to the Manager and Engineer. The damaged cable shall not be used. History of trailing cable used with the SDL machine namely, make, type, rating, voltage grade, date of installation, details of vulcanization/repair shall be maintained;

h) The trailing cable supplying power to SDL shall be controlled and protected by gate end box of proper rating. Gate end box shall be provided with earth leakage relay, overload relay, pilot core protection and HRC fuses in the incoming side of the proper supply.

9.2 Driving of SDL

a) No SDL shall be operated otherwise than by a competent person appointed in writing by the manager to be the driver of the SDL. For repairs or tests, the SDL can be operated by competent person other than the driver authorized in writing by the manager;

b) The headlights of the SDL machine shall be kept continuously 'ON' position during the operation of the machine;

c) SDL bucket shall be lowered and kept on ground when it is not in operation;

d) When the SDL is not working suitable provision shall be provided to isolate the machine;

e) When SDL is left standing on gradient, ensure that it is stationary and secured;

f) Before starting the SDL machine, all persons in the vicinity shall be duly alerted through pre-start audible warning and given sufficient time to move away to a safe place. When SDL is in operation, no one shall be allowed to be present in front and behind the machine frame where he is not likely to be visible to the operator;

g) SDL shall be brought to rest and power shall be cut off before undertaking any repair, servicing or adjustment. Before carrying out any maintenance work on the bucket in raised position, it shall be secured with suitable support or device; and

h) SDL shall not be used for transporting long material like ropes, bars, etc, for pushing or pulling bulky materials like tubs, pumps, etc.

9.3 Riding on SDL

a) Except the operator, no person shall ride any SDL when it is in motion; and

b) The control levers shall not be used as hand hold while climbing into the machine.

9.4 Gradient

The SDL shall not be allowed to ply on a gradient exceeding 1 in 6 unless otherwise permitted in writing by the Director General of Mines Safety, Dhanbad.

9.5 Parking

Every SDL shall, when not in use, be parked in a suitable station which shall:

a) be located at a safe distance from face to prevent damage due to blasting, etc, and have a notice board;

b) be provided with maintenance equipment such as tool box, lubricants, cleaning facility, etc; and

c) be provided with adequate lighting arrangement.

The operator shall ensure:

a) lowering the bucket and the telescopic boom to the floor.

b) cut-off the power supply to the machine.

9.6 Cleaning

Clean and rinse the side-discharge loader (SDL) especially the crawler drive unit at least once a week with compressed air/water jet. Do not clean the electrical apparatus with water jet.

9.7 Tools

Maintain all tools, particularly special tools and use only these during dismantling and assembling.

10 SAFETY REQUIREMENTS

Following requirements shall be complied with to increase the safety of personnel, mine and the machine:

a) Illuminate the working area of SDL;

b) During operation ensure that cables, hydraulic hoses do not cross over the crawler chains;

c) Use only approved type of hydraulic fluids;

d) When leaving the working place, operator must ensure the following:

    1) Boom is completely retracted;

    2) Bucket is lowered to the floor;

    3) All levers are turned to the neutral position, locked with the devices available and secured; and

    4) Energy supply is switched-off from switch gear.

e) Give pre-start alarm/warning before starting the machine;

f) Use insulated hand gloves of required voltage grade specifically for handling the trailing cables;

g) Ensure that all the protective switches of the SDL machine are operative;

h) Ensure that flame proof features of the SDL electrical/gate end boxes are in working order as per *Indian Electricity (IE) Rules*/DGMS approvals;

j) Ensure correct rotation of the cooling fan hydraulic motor;

k) Ensure that there is no leakage in the hydraulic circuit;

m) Ensure that the temperature limit of 65°C in the hydraulic circuit is not exceeded;

n) Protect the trailing cable from any external damage;

p) In any part of a coal seam at any time the presence of inflammable gas in the air is found to exceed 1.25 percent, the supply of energy shall be immediately disconnected from all cables and apparatus in the area. The supply shall not be resumed so long as the percentage of the inflammable gas remaining is in excess of 1.25 percent;

q) Adequate care shall be taken so that FRHF is not contaminated with dirt/coal dust. Filters shall be replaced as per the recommendation of the manufacturers;

r) Never do welding on cylinder, valves, motor body or even do not take earthing through it. If welding is unavoidable, use direct earth; and

s) SDL machine shall be parked, when not in use, preferably on a level floor, otherwise suitable wedge/stop block at both the ends of the track chain shall be placed.

ANNEX A

(*Clause* 8.1)

DAILY EXAMINATIONS

a) Inspect the brakes of SDL for effectiveness.

b) Inspect the crawler chain and its looseness.

c) Lubricate bearings and brake mechanism, inspect, adjust and lubricate chains where fitted.

d) Check that the driver seat is kept secured.

e) Ensure that the head lamps are securely attached to the frame of the SDL and that the glasses of lamps and instruments are clean and unbroken.

f) Check that the canopy is well secured in its position and the SDL is clean from dust, greasy or oil soaked waste.

g) Check and refill hydraulic oil tank and check the radiator.

h) Check that:

   1) All operating levers and other external fittings are intact, accessible and functioning correctly.

   2) All accessible parts of the inter connecting cables between the control gear of motor and other fittings are properly attached to the apparatus and secured to the frame of the SDL and appear to be undamaged.

   3) There is no external indication of overheating on any accessible part of the electrical equipment.

j) Before undertaking any examination or repair of bucket in raised position, check that it is fully secured with suitable support or other devices.

k) Check:

   1) Fire extinguisher,

   2) Audible warning devices,

   3) Oil level in hydraulic oil tank and also compressor, if provided, and top up, if necessary,

   4) Lights and trailing cable, and

   5) Gauges and instruments.

m) Remove covers when the motor running, inspect all oils, air and water pipes for any leaks and check readings of lubricating oil, hydraulic oil and pressure.

n) Check all enclosures of all flame proof equipments and all fixing bolts are in place and spanner tight. All flame proof flange joints show gaps (measured by feelers) not exceeding the permitted maximum value and the bearings of spindles and push nuts show no play.

p) Check that the operation of controller is free and the position on each notch is definite. The interlock between the controller main and dead man's handle features are in order.

ANNEX B

(*Clause* 8.1)

WEEKLY EXAMINATIONS

a) Examine the power transmission equipment.

b) Check brake levers, and examine oil filter.

c) Check radiator and inspect for any leakage, choking and damage.

d) Inspect the linkages between the drive and hydraulic pump.

e) Check that the interconnecting cables are undamaged and are properly secured to the chassis, clear of moving parts and the ends of the cables are securely attached to the apparatus.

f) Check that main fuses are of correct rating and are secured in the fuse holders.

g) The SDL shall be examined, tested and if necessary repaired or adjusted and necessary tests shall be carried out after each repair and adjustments.

h) Check the brake by conducting deceleration test and stand still test.

j) Check and ensure that the SDL is not operated at a pressure higher than what is recommended by the manufacturer.

k) Check the crawler chain for worn out pads, pines, bushes, etc. Also check for proper tension of crawler chain.

m) Check cable reel and its limit switch for its safe and satisfactory operation.

n) Check thoroughly the entire length of trailing, cable and the end fittings for any defect. If any defect or damage is found, the same shall not be used.

p) Check and if necessary replace all weak, broken, or missing springs which centre the hydraulic control valve levers in the neutral position. SDL shall not be used, if control valve levers do not return to neutral position when left free.

ANNEX C

(*Clause* 8.1)

MONTHLY EXAMINATIONS

a) Check the oil level in the gearbox or gear case and top-up as necessary.

b) Check the power transmission and its accessories.

c) Check contamination of lubricating oil and hydraulic oil.

ANNEX D

(*Clause* 8.1)

EXAMINATION AT 5 000 HOURS

a) Examine all belt drives, chains and pulleys and replace any defective parts.

b) Examine crawler chain and bearings for wear.

c) Examine linkages and pins in the braking system for wear and security of pins and fasteners, wherever applicable. Adjust and replace as required.

d) Replace the charge in the fire extinguisher.

e) Examine and repair all valves, springs and clearances.

f) Check the tension and condition of the track chains, etc.

g) Drain and refill the hydraulic oil tank.

h) Examine and test the safety devices and safety valve.

ANNEX E

(*Clause* 8.1)

EXAMINATION AT 10 000 HOURS

a) After every 10 000 h the competent person appointed by the manager shall test and renew defective parts and test pressure gauges.

b) Examine the main frame for cracks.

c) Examine and adjust crawler chain and bearings and renew worn or defective parts.

d) Examine drive sprockets and springs and check for soundness and alignment.

e) Dismantle brakes, examine, adjust and renew worn or defective parts.

f) Test the speed km/h indicator and cables.

g) Dismantle the hydraulic pump, examine pistons and rings. If rings are worn out, renew both pistons and rings (New rings should not be fitted in worn piston groove).

h) Examine bearings, and replace if worn out.

j) Flush all hydraulic hoses and blow with compressed air, test the hoses by hydraulic pressure for soundness.

k) Thoroughly clean the hydraulic oil tank.

m) Examine hydraulic oil filter and replace worn out or defective parts.

n) Examine and repair all parts of transmission system including bearings, if necessary clutch and covers, gear box couplings torque converters, if provided and replace worn or defective parts.

ANNEX F

(*Foreword*)

COMMITTEE COMPOSITION

Mining Techniques and Equipment Sectional Committee, ME 08

Organization	*Representative(s)*
Directorate General of Mines Safety, Dhanbad	Shri J. P. Kashyup (***Chairman***) Shri P. K. Ganguly (*Alternate*)
Bharat Coking Coal Ltd, Dhanbad	Shri Ramji Sahay
Bharat Earth Movers Ltd, Bangalore	Shri V. Palaniswamy Shri T. R. Loganathan (*Alternate*)
Central Coalfileds Ltd, Ranchi	Chief General Manager (Operations) Chief General Manager (Equipment) (*Alternate*)
Central Mine Planning and Design Institute Ltd, Ranchi	Shri S. K. Chatterji Shri U. Roy (*Alternate*)
Central Mining Research Institute, Dhanbad	Shri A. K. Ghose Shri S. K. Ritolia (*Alternate*)
Eimco Elecon (India) Ltd, Vallabh Vidyanagar	Shri A. M. Deshpande Shri Ravindra Luthra (*Alternate*)
Gujarat Mineral Development Corporation, Ahmedabad	Shri S. N. Mathur
Hindalco Industries Ltd, Distt Sonbhadra	Shri K. K. Patodia Shri Ashok Bamzai (*Alternate*)
Hindustan Copper Ltd, Kolkata	Shri Kamlesh Singh Shri O. P. Bhardwaj (*Alternate*)
Hindustan Zinc Ltd, Udaipur	Shri K. C. Jain

Organization	*Representative(s)*
Kapur Mining Equipment Pvt Ltd, Asansol	Shri Dipak Kapur Shri Tapan Dutta (*Alternate*)
Mahanadi Coalfields Ltd, Dist Sambalpur	Shri R. B. Upadhyay Shri B. P. Pattnaik (*Alternate*)
Manganese Ore (India) Ltd, Nagpur	Shri P. M. Reddy Shri G. Wangneo (*Alternate*)
Mecon Ltd, Ranchi	Shri H. C. Mishra Shri H. K. Bhanjdev (*Alternate*)
Nanda Millar Co, Kolkata	Shri J. P. Goenka Shri Pankan Goenka (*Alternate*)
National Aluminium Co Ltd, Bhubaneswar	Shri R. C. Pati Shri C. M. D. Murthy (*Alternate*)
National Mineral Development Corporation, Hyderabad	Shri A. K. Gupta Shri C. V. Suresh (*Alternate*)
South Eastern Coalfields Ltd, Bilaspur	Shri Kapil K. Rai
The Eastern Coalfields Ltd, Sanctoria	Shri S. C. Basu Shri D. K. Roy (*Alternate*)
The Hutti Gold Mines Company Ltd, Distt Raichur	Dr M. L. Patil
The Singareni Colleries Co Ltd, Distt Khammam	Shri K. Raghavendra Rao Shri E. Raja Rao (*Alternate*)
The Tata Iron and Steel Co Ltd, Distt Dhanbad	Shri R. S. Singh Shri V. K. Srivastava (*Alternate*)
TRF Ltd, Jamshedpur	Shri S. S. Mukhopadhay Shri N. C. Goswami (*Alternate*)
Western Coalfields Ltd, Nagpur	Shri A. K. Haldar Shri P. S. Raju (*Alternate*)
BIS Directorate General	Shri C. K. Veda, Scientist 'F' and Head (MED) [Representing Director General (*Ex-officio*)]

Member Secretary
Shri T. V. Singh
Scientist 'E' (MED), BIS

(*Continued from second cover*)

The Indian Standards mentioned above relate to earth-moving machinery which are used as off-highway equipment and are generally diesel operated. Some of these standards can, however, be made applicable to similar equipment used in underground mines with modifications specially relating to prime mover. Manufacturers and users of side-discharge loaders (SDL) are, therefore, requested to examine these standards and apply their provisions during design, manufacture, selection, operation and maintenance of SDL's.

This Indian Standard on side-discharge loaders for underground application has made references to some of the standards listed above. These standards specifically do not cover the crawler mounted, electrically operated machines specified in this standard. However, provision of these standards is equally applicable to SDL's with modifications. In addition, provisions of IS 11114 (Part 2) : 1993, IS 11114 (Part 3) : 1993, IS 12206 : 1993 and IS 11311 : 1985 'Technical requirements for loaders for use in underground mines' may also be used during implementation of this Indian Standard.

Mines Act, 1952 and Rules and Regulations made thereunder have stipulated certain restrictions on the use of loaders in underground mines. Accordingly, the approval of the Competent Authority has to be obtained by the user of the equipment before installation of the equipment (*see* **5.1**).

The Committee responsible for the formulation of this standard is given at Annex F.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Bureau of Indian Standards

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc: No. ME 08 (0787).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

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